A Denunciation of The Monochrome

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Abstract

The purpose of this proposal is to demonstrate the plans our organization has made in order to enhance the current functions of the autonomous agents made available to us at The University of Texas Computer Science Department.

Our goal for this semester is to **enhance the human/ agent interaction experience**. We would like the interactions with the robots to be **more intuitive**, **easier to understand**, and **to not be completely devoid of personality.** At the time of writing this proposal, there does not seem to be any LED strip peripheral functionality programmed into the UTCS robots. We are excited to share our ideas for functions we can implement to achieve our goal.

Dynamic communication of visual data

Non-verbal communication is essential to a significant amount of interactions humans have with each-other. Eye contact and other visual cues can provide important contextual information. Robots are incapable of performing the same nonverbal behaviors that humans exhibit. Our plan is to use an LED strip in order to communicate tidbits of visual data without having to look at a monitor display. The LED will also be useful in helping humans to observe the robot's behavior from a distance. Please note that our group does not have prior experience in programming the implementations so all the following steps towards our goals are nothing but speculation.

We have settled on two main ideas, each of which utilizes the LED strip as a method for the robot to visually communicate information to human companions. The first of these ideas is for the robot's LED strip to display different colors depending on proximity to obstacles. The second is for the robot's LED strip to display the shirt color of the human with whom the robot is interacting. Both of these will allow the robot in question to non-verbally communicate with humans by changing the color of its LED strip.

Displaying colors based on proximity to robot

In situations where there are many humans attempting to observe a robot, such as in a public demonstration, the humans can end up crowding the robot, which leaves it unable to do anything without potentially running into obstacles. As such, we propose to write a program that gives our robots the ability to communicate nonverbally that it is

being crowded or has someone too close to it. According to our design, the robot's LED will turn green when not in proximity of an object. When the robot approaches an obstacle, the LED will switch to yellow, to indicate caution. In the instance of too many objects near the robot, its LED strip will then angrily flash red to communicate to the nearby humans that it needs some room.

Displaying the shirt color of a particular human

When one endeavors for a robot to interact with an individual human, especially in a setting with multiple humans around, it may be useful to have a way for the robot to indicate which particular human it is interacting with. Our idea is for the robot to identify the shirt color of the human it is focused on and display that color on its LED strip to communicate which human it is attempting to interact with. This may be helpful in a research setting, as it is a simple way to check which human a robot is focused on interacting with. It may also be useful in a public demonstration setting, to reduce confusion on who a robot may be focusing on.

Testing the implementation

Testing our robot should be a fairly simple process. The first problem will be checking if the LED colors change based on proximity. To test this implementation a group of people will stand near the robot and in it's path to see if the LED changes. In addition the robot can be tested by having it move around in a lab setting. The second problem of color coordination will be tested by humans wearing different colored shirts who will take turns standing in front of the robot.

Timeline Proposal

Week 1: Attempting to learn how we are going to implement our solution, figuring out what software or packages we need, getting a hold of the LEDs.
Week 2: We need to find a way to attach the LEDs to the robot as a peripheral, learn how to change colors of the LED strip, Design a color palette to work with.
Week 3-4-5: Programming the difficult code into the robot like
        -Figuring out how to detect a human
        -Figuring out how to partition the human into something more understandable
        -Match the color of the human's shirt with a corresponding RGB value.
        -Being able to change the LED colors by sending it RGB values as parameters